Answer on Question #52073, Physics, Mechanics | Kinematics | Dynamics

A particle of mass m is moving in a circular path of constant radius r such that radial acceleration a=k^2+r^2. Find the power delivered to the particle by the forces acting on it.

Solution:

The radial acceleration is

$$a_r = \frac{v^2}{r}$$

From given

$$a_r = k^2 + r^2$$

Thus,

$$\frac{v^2}{r} = k^2 + r^2$$

$$v = \sqrt{k^2 r + r^3}$$

The force is

$$F = ma = m(k^2 + r^2)$$

Power

$$P = Fv = m(k^2 + r^2)\sqrt{k^2 r + r^3}$$

Answer: $m(k^2 + r^2)\sqrt{k^2 r + r^3}$